CLINICAL CONFERENCE

Tetany in Postoperative Thyroid Cases

FROM THE STAFF ROUNDS OF THE MT. ZION HOSPITAL, SAN FRANCISCO, MARCH 7, 1947

DR. FRANKLIN I. HARRIS*: The subject that we are discussing today has been chosen because of the recent occurrence within one month of the two cases of tetany following thyroidectomy. Until this past month we had not seen a like case in this hospital for at least 15 years.

PRESENTATION OF FIRST CASE BY DR. KENNETH MOOSLIN, INTERN: The patient was a 25 year old white married female, who was admitted on February 1, 1947, for a thyroid operation. She had had a goiter for 12 years and in the two months prior to entry had developed symptoms of toxicity of it. On February 4 sub-total thyroidectomy was done. During surgery the four parathyroids were demonstrated. That evening the patient complained of tingling and numbness of the extremities, but Chvostek's and Trousseau's signs were negative. The symptoms continued; on the third postoperative day the patient showed a positive Chvostek's sign and the blood calcium was shown to be 6.8 mg. per cent (normal 9-11). She was placed on a regime which included calcium gluconate orally (2 gm. q.i.d.) and by vein (10 cc. of 10 per cent solution b.i.d.); dihydrotachysterol (½—1 cc. t.i.d.); and ammonium chloride (2 gm. q.i.d.). Calcium levels were followed by examinations of the blood and urine (Sulkowitch).† The blood calcium gradually increased and the urinary output of calcium gradually decreased to normal. The patient was discharged on the tenth postoperative day, asymptomatic by both clinical and laboratory study. She continued to take Hytakerol on discharge and was instructed in the technique and significance of the Sulkowitch test.

DR. HARRIS: The operation in this case was technically a fairly easy bilateral sub-total thyroidectomy. The parathyroid glands were demonstrated to the house officers assisting me. On the first and second postoperative days, when the patient started complaining of numbness and tingling, it was felt that she was "merely nervous" and that there was some element of hysteria. However, on the third day, simultaneously with the blood chemistry studies which were ordered, there appeared a strongly positive Chvotek's sign. By this time we were all convinced that her so-called nervousness and tingling were definite evidence of a severe calcium deficiency and that immediate treatment should be instituted.

DR. GERSON R. BISKIND‡: In the specimen removed, one parathyroid gland was demonstrated. We routinely examine thyroid tissue for parathyroid glands, but sometimes they are extremely difficult to demonstrate.

PRESENTATION OF SECOND CASE BY DR. MILTON PEARL, ASSISTANT RESIDENT: A 29-year-old female was admitted complaining of loss of weight, tiredness, weakness, and crying spells. Her BMR was +33. She was prepared with Lugol's solution and thiouracil for ten days, after which a bilateral subtotal thyroidectomy was done. During the procedure one parathyroid gland was removed. On the first day postoperatively she complained of numbness and tingling. Chvostek's sign was doubtful. She was given 1 gm. of calcium gluconate intravenously, 50,000 units vitamin A daily and 15 gm. of calcium gluconate t.i.d. by mouth. On the second postoperative day the Chvostek's and Trousseau's signs were negative, and she was subjectively asymptomatic.

On the third postoperative day I heard the patient scream, entered the room to find her unconscious. She lay in complete opisthotonos; the arms were adducted and the hands in complete carpopedal spasm. She was apneic and exhibited severe cyanosis. Within 30 seconds she was given 0.5 gm. of calcium chloride intravenously. Before the injection was completed, she had relaxed, was breathing well, and had completely regained consciousness. She had no recollection of the attack. The only residual evidence of the attack was the presence of a right subconjunctival hemorrhage. Calcium was administered intravenously when either the Chvostek's or Trousseau's sign was positive and when the Sulkowitch test showed low calcium excretion. Calcium gluconate 15 gm. t.i.d., viosterol 100,000 units daily, Dihydrotachysterol 1 cc. t.i.d., and ammonium chloride 1 gm. t.i.d. were administered. She remained relatively asymptomatic. A blood calcium on the fifth postoperative day was 10.5 mg. per cent. She was discharged on the eighth postoperative day.

DR. JACOB O. SMITH*: At home this patient ran her own Sulkowitch tests and regulated medication accordingly. She gradually reduced the dosage of the above drugs; approximately one month after her discharge she was perfectly well, had stopped all her medication and clinically did not present any evidence of tetany. Her blood calcium was normal at this time. It is almost one year now since the operation, and her blood calcium is still normal. She

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† The Sulkowitch test requires merely the addition of an alkaline oxalate solution to the urine. If calcium is present, a white precipitate forms.

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has no symptoms whatsoever and has not taken any more medication.

DR. KALMEN A. KLINGHOFFER†: The first patient developed tetany when only one parathyroid gland was removed. One would expect the four remaining parathyroid glands to take care of the essential function of these glands. It is probable that the symptoms were the result of trauma and temporary impairment to the blood supply of the four remaining glands. Some patients continue to require treatment for the symptoms of parathyroid insufficiency, whereas in others the disability is transient.

It is usually routine to diagnose tetany if the serum calcium falls and to control the treatment by the level of the serum calcium. One should remember, however, that the total serum calcium level varies with the serum protein level and that tetany is affected only by that portion of the calcium not bound to protein. If a patient does not have manifest tetany, one can demonstrate latent tetany by having the individual overventilate. Dehydration, too, makes the patient more susceptible, and the tetany manifest.

The management of Dr. Harris's patient was rather easy, as the tetany was only mild and the severe carpopedal spasm demonstrated by Dr. Pearl in the second patient was not present. The first patient was given calcium gluconate, viosterol, and dihydrotachysterol and the serum calcium gradually rose to 10.5 mg. per cent. The dihydrotachysterol dosage was then reduced. It has been customary to recommend a diet low in milk in patients with tetany because of the large amounts of phosphorus present; but with the other therapeutic aids, I do not think it necessary to subject the patient to an abnormal dietary regime. This patient tests her own urine. Serum calciums are determined at infrequent intervals.‡

Dihydrotachysterol was discovered 15 years ago by Holst and is more effective than Calciferol but is rather expensive. Therefore, as a patient improves, this is the medication first reduced. Calcium gluconate is given three times a day in tablespoonful doses; if medication is urgently required, it or calcium chloride should be given intravenously. Parathormone acts similarly to mobilize calcium, but the action is not immediate and injections have to be repeated at least once daily. It probably has no role in therapy now except in cases of parathyroidectomy for parathyroid adenoma.

DR. JOHN J. SAMPSON§: Doesn't tetany occur more promptly following total thyroidectomy?

DR. HARRIS: It occurs with comparative rarity. Dr. David Berlin of Boston, who did much of the fundamental anatomical dissection in conjunction with this radical operation, stated that he had seen cases in which four to six parathyroids had been removed without clinical evidence of tetany.

DR. SMITH: Very frequently the symptoms are mild until two to three days after thyroidectomy. At the Mayo Clinic one out of ten patients developed some symptoms. I personally have had at least six to eight patients with postoperative tetany, all of which cleared under treatment in from two days to one month, usually all within several days after symptoms developed. I recall only one patient whom I saw about two years after thyroidectomy in whom tetany had persisted. Apparently two parathyroid glands had been removed at the time of operation. From all I could gather, the patient had received intensive therapy but continued to have symptoms. The blood calcium hovered around 8 mg. per cent. In the past five years the symptoms have been kept under control with approximately 8 gm. of calcium gluconate daily and 50,000 units of vitamin D two or three times weekly. There was no response to parathormone or AT 10. I would like to suggest that this method of treatment be applied to postoperative tetany cases immediately after the acute episode has been regulated in the usual manner.

DR. MILTON GORDON*: The number of parathyroid glands that can be demonstrated depends to a large extent on the visual acuity and experience of the surgeon. There is a direct relationship existing between the number found and the time spent in the search for them. Although four parathyroids are usually found, we must call this an average, rather than normal, since variations in number and position are common occurrences. Eight have been reported and, in one instance, six have been noted on the same side. The superior parathyroid glands are more constant in position, whereas the inferior glands vary greatly in position. They have been found on the posterior aspect of the trachea and even within the chest. However, wherever they are located, they will always be noted along one of the branches of the inferior or superior thyroid arteries.

Dr. R. Millzner, who has been studying the parathyroids since 1926, found, in cadavers, 30 per cent of the specimens to have one or more parathyroids on the true anterior or antero-lateral portions of the thyroid capsule. He has seen two but never three parathyroids removed at operation without some signs and symptoms of tetany arising.

A more common cause for parathyroid deficiency is injury to the glands, rather than removal. Each parathyroid receives only one small artery which usually is a branch of the inferior thyroid or an anastomosing ramus between the inferior and superior thyroid arteries. The superior parathyroid glands sometimes receive their blood supply directly from branches of the superior thyroid artery. All parathyroid glands have end artery supplies without direct collateral from any of the surrounding tissues. If the artery to a parathyroid gland is injured during operating, the gland will act as a graft; and unless it takes or compensation occurs, symptoms of deficiency will become manifest. Intact parathyroid glands often hypertrophy to compensate for injured

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‡ This patient discontinued all therapy April 15, 1947. On May 8, 1947, she was asymptomatic and all examinations were normal. The serum calcium level was 10.4 mg. per cent.

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ones. It is therefore recommended that as much capsule as possible be permitted to remain during thyroidectomy. Too diligent search for the parathyroids may embarrass the blood supply and lead to difficulty.

DR. HARRIS: I am convinced that the demonstration which I made of the parathyroids probable interfered with the minute circulation to these important structures. I assure you that next time I will not demonstrate so conscientiously to my house staff.

I would like to ask why calcium therapy is not used more extensively in medical practice for many of the minor complaints of tingling, numbness and other forms of parasthesia. The striking effects of calcium therapy in this patient with a serious deficiency would seem to me to indicate that it could be used with value in many similar minor medical complaints that clinically simulate calcium deficiency.

DR. SAMPSON: In cases of hyper-ventilation, calcium can be used on an empirical basis. We do not like to use it indiscriminately, since many of these cases have a psychic element. There is also the danger of overdosage of calcium, since it is not a completely innocuous drug. I recall one case in which it caused death.